



# Aluminum Systems Guide

# The Miller difference

Aluminum isn't easy to weld: it has a lower relative melting point than other metals yet requires heat to ensure proper puddle formation. Cleanliness is critical. It is more sensitive to heat input and distortion. Aluminum wire is also softer and more difficult to feed through a wire feeder and gun than other metals.

High-quality welds are attainable, despite these challenges, through specialized welding systems and filler metals.

Whether your shop uses aluminum exclusively or on a project-by-project basis, Miller has the MIG and TIG solutions for every application. Our complete line of easy-to-use welding equipment offers unsurpassed performance, superior puddle control and appearance, and consistent arc quality — resulting in code quality welds every time you strike an arc.

Miller aluminum MIG systems rely on advanced technology that actually simplifies welding while providing the smoothest, most consistent aluminum wire feeding on the market. Miller aluminum TIG systems provide superior arc performance and control that provide optimum quality, performance and aesthetics.

Miller equipment makes aluminum welding easy, efficient and profitable — helping you improve weld quality, boosting operator confidence, and keeping you ahead of the competition. Choose the right aluminum solution from Miller's cost-effective, versatile, and reliable equipment for your demanding applications.





# Your total welding solutions provider

Miller is committed to providing a total aluminum welding solution for your business. You can count on our easy-to-use equipment to improve quality and increase your productivity, profitability, and peace of mind.

## As your comprehensive resource, Miller delivers:

- **Single point of contact** — a Miller welding professional to guide you through every step of the process.
- **Dedicated business partners you know and trust** — your Miller representative and local welding distributor.
- **Real industry experience** — innovative products and services designed for the demands of everyday fabrication.

## Countless capabilities. Trusted advice. Integrated offerings.

Get more choices and improve your welding productivity with ITW brands. Miller, Bernard, Hobart Brothers, Smith, Tregaskiss, and Weldcraft all work together to create a comprehensive welding solution. And premium MAXAL filler metal completes our total aluminum welding offering.

## Introduction to aluminum welding

Aluminum is specified for many reasons: it's 1/3 the weight of steel, features a high strength-to-weight ratio, is corrosion-resistant and has excellent thermal and electrical conductivity. Technologically advanced Miller equipment simplifies and improves aluminum welding and is backed by world-class customer support.

## Aluminum welding markets

1. **Shipbuilding** — military, commercial and recreational
2. **Transportation** — semi-truck trailers, carriers and emergency vehicles
3. **Leisure/recreation/general fabrication** — boats, RVs, utility trailers, truck accessories, signs and lawn furniture
4. **Automotive** — suspension, frames, body, radiators, drive shafts and wheels
5. **Personal user** — hobbies, metal object fabrication and home repairs





# Shipbuilding

## Military, pleasure and commercial ships

Aluminum is increasingly specified on ships of all sizes because it makes them lighter without sacrificing strength and functionality. This makes them faster, saves on fuel and provides ships with the corrosion resistance benefits of aluminum — but it also presents numerous welding challenges. Whether your operation requires fast production speeds (hull construction) or intricate detail work (aluminum pipe and fittings), Miller has the right solution.



## AlumaFeed® Synergic MIG System

- AlumaPower™ 350 MPa power source
- XR-AlumaFeed® wire feeder
- XR-Aluma-Pro™ gun

### System features and benefits:

- Portable wire feeder ideal for going up stairs, through portholes or mounting on booms to reach every corner of the work area.
- Achieve the stacked dime appearance of TIG with the production speeds of MIG thanks to Miller's Profile Pulse™ technology.
- Easy to use/reduces burn through and distortion: One-knob synergic welding control sets the correct Pulse parameters based on the wire feed speed set by the operator; allows the operator to adjust to varying joint profiles or material thicknesses.
- Ensure proper fusion at the beginning of the weld, thanks to Hot Start technology.
- Long, linear welds easily performed, thanks to interface with semi-automatic welding systems/positioners.
- Further simplify operation with built-in Pulsed MIG programs designed for most commonly used aluminum alloys.

*"Distortion was a big factor for us. Our previous MIG process caused distortion and it created rework. We moved to Pulsed MIG because of the distortion control and the speed."*

**Johnny Boudreaux**, Inspector-quality assurance,  
Bollinger Shipyards





## Dynasty® 350 TIG System

- Dynasty 350 power source

### **System features and benefits:**

- Capable of welding a wide variety of thicknesses and types of aluminum, ranging from thin sheet to pipe.
- Ensures an excellent finish through reduced spatter, cleanup and distortion.
- Easily join thick materials to thin materials while ensuring proper penetration and not blowing through the thin section.
- Joining hangers and brackets to the superstructure is simplified with advanced AC TIG controls that ensure optimum quality and aesthetics with a smooth finish.
- Address changing geometries, varying joint fit-ups and inconsistencies with remote amperage control.



# Transportation

## Semi-truck trailers, carriers and emergency vehicles

Welding for the transportation industry requires strength and quality as these components take a heavy beating on the road. There's also a wide variety of assemblies and production methods that require operational flexibility, including switching from aluminum to other metals. That's why Miller offers MIG and TIG systems that ensure the functionality and appearance of the vehicles on our highways.



## Invision™ MPa Plus MIG System

- Invision 352 MPa Plus power source
- D-74 MPa Plus dual wire feeder
- XR-Aluma-Pro™ Plus gun

### System features and benefits:

- Increase wire feeding consistency to improve productivity with advanced push-pull wire feeding technology.
- Achieve the “stacked dime” appearance of a TIG weld and MIG production speeds with Miller's Profile Pulse™ technology.
- Can reduce or eliminate porosity and inclusions in the weld with easy-to-use start and crater functions.
- Quickly switch from aluminum to other alloys with a dual wire feeder.
- Easy to use/prevent burn through and distortion: one-knob synergic welding control sets the correct Pulse parameters based on the wire feed speed set by the operator; allows the operator to adjust to varying joint profiles or material thicknesses.
- Extend welding range for large trailers and assemblies with Miller's Alumatation™ technology for reliable, dependable and consistent wire feeding over longer distances.

*“Aluminum welds different than everything else.... I know that when I use a Miller welder, I'm going to be productive. I know I can count on it.”*

**Brad Duquaine**, Fire Panel welder/fabricator,  
Pierce Manufacturing





## Dynasty® 350 TIG System

- Dynasty 350 power source

### **System features and benefits:**

- TIG inverter benefits include increased productivity, improved quality, energy efficiency and portability.
- Deposit filler metal in a very controlled manner to meet superior weld quality and aesthetics standards.
- Ensure fit-up and alignment of bracket and tubing assemblies by eliminating spatter, arc wandering and over-welding.
- Ideal for fabricating leak-free water and fuel tanks/fittings from aluminum sheets and tubing.
- Advanced AC TIG controls produce defect-free welds, improve cleaning action, reduce etching and control heat input to minimize distortion and maintain critical dimensions.



# Leisure/Recreation/ General Fabrication

## Boats, RVs, utility trailers, truck accessories, signs and lawn furniture

Projects in this market vary considerably, which results in the critical need for versatility in welding equipment. Superior strength-to-weight ratios, corrosion resistance, sturdy wall joints and aesthetic welds are essential in these applications. Miller aluminum systems offer the flexibility and mobility you need for everything from subassembly to the final weld.



## Millermatic® 350P MIG System

- Millermatic 350P power source
- XR-Aluma-Pro™ gun

### System features and benefits:

- Compatible with most Miller Push-Pull guns for consistent wire feeding; expands work envelope up to 35 feet without moving the power source.
- Pulsed MIG reduces heat input, resulting in less warping, distortion and spatter — increasing productivity and reducing rework. Ideal for thin gauge materials.
- Easy to use: One-knob synergic welding control sets the correct Pulse parameters based on the wire feed speed set by the operator; allows the operator to adjust to varying joint profiles or material thicknesses.
- Produces high deposition rates and fast weld speeds for long joints and production welding.
- Compact, self-contained, all-in-one welding system with running gear makes it easy to move around the weld cell.

*“The ability to adjust the wire speed on the gun is great. It makes it tremendously easier without having to stop, run over and turn the welder down. You can just look at the welder, see what you’re doing, turn it up and you’re done.”*

**Robert Palmer**, Welder, Springfield Specialties





## Dynasty® 350 TIG System

- Dynasty 350 TIG Runner

### **System features and benefits:**

- TIG inverter benefits include increased productivity, improved quality, energy efficiency and portability
- Capable of welding a wide range of material, including thin gauge to 5/8" thick aluminum.
- Precise arc and directional control for accurate weld sizing and placement.
- Reduced distortion and burn-through on thin and delicate parts.
- Produces aesthetically pleasing welds with no sparks, spatter or slag, reducing cleanup and finishing time.
- Advanced AC TIG controls allow for welding anodized aluminum in a single pass — a major increase in productivity.
- Remote amperage control lets you compensate for changing geometries, varying joint fit-ups, and inconsistencies — without sacrificing weld integrity.



# Automotive

## **Suspension, frames, body, radiators, drive shafts and wheels**

Fabrication for the automotive market requires repeatable, high-quality welds for all subassemblies and assemblies. Available for MIG and TIG, Miller Automation features an integrated welding power supply inside the robot controller that delivers precise arc starts and stops, reduces the amount of rework and secondary operations and ultimately increases productivity.



## **TAWERS™ MIG Automation System**

### **System features and benefits:**

- Lift start results in precise arc ignition, eliminating costly wire burn-back that destroys the tip.
- Retract start reverses the wire the moment it touches the part, avoiding bird nesting.
- As the robot transitions from thin to thick sections, spiral weaving adjusts the amount of heat input for better weld control.
- Robot controls let the weld ramp up and down without moving the robot, providing either a back-stepped crater or the perfect button at the end.
- Synchronized low pulse produces an ideal bead appearance.
- Servo Push-Pull feeding systems on robots provide the precision and performance necessary for successful aluminum welding.









# Personal User

## Hobbies, metal object fabrication and home repairs

It is now easier than ever for welders of all skill levels to weld aluminum.

Whether you use your welding equipment to repair things, create art, or support your motorsports habit, Miller offers easy-to-use MIG and TIG machines that deliver the flexibility, portability and professional results you want at an affordable price — all while simplifying controls and operation.



## Millermatic® 211 Auto-Set™ with MVP™ MIG System

- Millermatic 211 power source
- Spoolmate™ 100 spool gun

### System features and benefits:

- Great welding versatility — capable of welding 24 ga. to 3/8" aluminum and steel.
- Spool gun options for improved aluminum feeding and extending the work envelope.
- Auto-Set makes setup easy — MVP technology allows you to use either 115 V or 230 V power simply by changing the plug (230 V power recommended when welding aluminum).
- Compact and portable for easy maneuvering around shop.

*"Quality equipment can make a quality weld, period."*

**STRETCH**, world-renowned artistic metalworker,  
STRETCH Sculpture





## Diversion™ 180 TIG System



- Diversion 180 power source

### **System features and benefits:**

- Great welding versatility — capable of welding up to 3/16" thick aluminum and steel.
- Easy to use — selecting material type and thickness sets the parameters, further simplifying the TIG process.
- Works no matter what your input power is; as MVP technology allows for operation on 115 V or 230 V power — simply by changing the plug.
- Arc inconsistencies from input power fluctuations are eliminated with Miller's Auto-Line™ technology.
- Extreme portability — weighs only 50 lb. and has two convenient cord-wrap handles.

## Aluminum MIG Systems

Millermatic® 252  
Spoolmatic® 30A package



**Personal User**

Millermatic® 350P  
XR-Aluma-Pro™ package



**Light Industrial/MRO**

AlumaFeed® Synergic System



**Industrial**



Millermatic® 211 Auto-Set™ with  
MVP™ and Spoolmate™ 100 Series



Millermatic® 252  
XR-Aluma-Pro™ package



Invision™ MPa Plus System

## Aluminum TIG Systems

Diversion™ 180



**Personal User**

Dynasty® 200 DX



**Light Industrial/MRO**

Dynasty® 700 TIG Runner



**Industrial**

**Heavy Industrial**



Diversion™ 165



Dynasty® 200 DX complete package



Dynasty® 350 TIG Runner





# Aluminum Filler Metal

Having high-quality aluminum filler wire matched with equipment designed specifically for welding aluminum



is extremely important. The quality of aluminum filler metal is a major factor in the development of a successful aluminum welding system. Poor quality aluminum filler metals create serious problems, including bird nesting and weld defects.

The optimum solution for an aluminum welding system is to combine the most appropriate Miller welding equipment with the high quality characteristics of MAXAL aluminum filler metal.

## Your source for quality filler metal

MAXAL is dedicated to delivering the highest quality products at a reasonable cost. With newly developed fabrication technologies, our aluminum wire is setting the standard around the world for quality.

As a premium filler metal solution, MAXAL aluminum wire is manufactured by a team with decades of experience in aluminum filler metals. It's produced from a state-of-the-art facility, entirely built around aluminum wire production, with custom-built equipment and proprietary processes and production techniques.

MAXAL's expertise and customized, innovative manufacturing processes provide aluminum wire with excellent soft-start characteristics and minimal burn back. Manual applications achieve a greater weld bead quality with minimal oscillation. MAXAL wire also features superior feedability with minimal bird nesting, extended liner and consumable life, and excellent x-ray quality.

## MAXAL Products Deliver:

- Extreme cleanliness (able to exceed the AWS porosity standard)
- Outstanding feedability
- Superior arc stability
- Superior arc starts
- Excellent welder appeal for repeatability and consistency
- Wire diameter control 1/10th of allowed AWS specification
- Plant and product certifications ISO 9001, AWS, CWB, ABS
- Available in spools, baskets, straight lengths and drums
- Wide range of alloys available for MIG and TIG welding include:  
Alloys 1100, 4043, 4047, 5356, 5183, 5554, 5556, 5087

# Aluminum Systems Guide

The structural and aesthetic benefits of aluminum continue to make it one of the most specified materials in the industry today. The challenges — whether in transportation, shipbuilding, fabrication, manufacturing or home/hobby — are similar: distortion, cleanliness, quality and speed. Arming yourself with the right equipment and consumables will make the job easier. Contact your local Miller distributor for more information or visit [MillerWelds.com](http://MillerWelds.com).

